Abstract

~~Suppose that there are n Senders and r Receivers. Our goal is to design a communication network,~~
A communication network is disclosed such that long messages can be sent from Sender i to Receiver p(i) such that no other receiver can retrieve the message intended for Receiver p(i). The task can easily be completed using interconnection networks and routers ~~in the network~~. ~~Alternatively, if every Receiver is directly connectes to all n Senders, then the Senders can choose which channel to use for communication, without using any routers~~. Fast optical networks are slowed down considerably if routers are inserted in their nodes. Moreover, handling queues or buffers at the routers is extremely hard in all-optical setting. ~~An obvious routerless solution, connecting each possible Sender-Receiver pairs with direct channels seems to be infeasible in most cases~~. A method, ~~solving this problem~~, is disclosed in which the Senders and the Receivers are connected with only a small number of channels (in practice no more than 32 channels); there are no switching or routing-elements in the network, just linear combinations of the signals are computed. Such designs are usable in very fast all-optical networks. The security of the network does not depend on any unproven cryptographical or complexity theoretical assumptions.